4(d) RULE EVALUATION AND RECOMMENDED DETERMINATION

FMEP SUBMITTED BY: Oregon Department of Fish and Wildlife

FISHERIES OR AREA: Oregon tributary fisheries potentially affecting listed Columbia River chum salmon (*Oncorhynchus keta*)

EVOLUTIONARILY SIGNIFICANT UNIT (ESU): Columbia River chum salmon (*Oncorhynchus keta*)

4(d) RULE LIMIT: Limit 4

TRACKING NUMBER: NWR/4d/04/2001/014

DATE:

The Oregon Department of Fish and Wildlife (ODFW) has submitted a Fisheries Management and Evaluation Plan (FMEP) for Oregon tributary fisheries potentially affecting listed chum salmon in the Columbia River basin (ODFW 2001). This plan was submitted for NOAA's National Marine Fisheries Service (NOAA Fisheries) approval under limit 4 of the anadromous fish 4(d) Rule (50 CFR 223.203(b)(4); July 10, 2000; 65 FR 42422).

EVALUATION

The Columbia River chum salmon ESU is listed as threatened under the Endangered Species Act (ESA). The 4(d) Rule for this ESU states that the prohibitions of paragraph (a) of the rule do not apply to fishery harvest activities provided that:

- Fisheries are managed in accordance with a NOAA Fisheries approved FMEP, and
- Fisheries are implemented in accordance with a letter of concurrence from NOAA Fisheries.

NOAA Fisheries can approve an FMEP if it adequately addresses the criteria specified below. The following is an evaluation of whether the submitted FMEP adequately addresses the criteria for limit 4 of the 4(d) Rule for Columbia River chum salmon.

Limit 4 Criteria and FMEP Evaluation

Clearly defines its intended scope and area of impact.

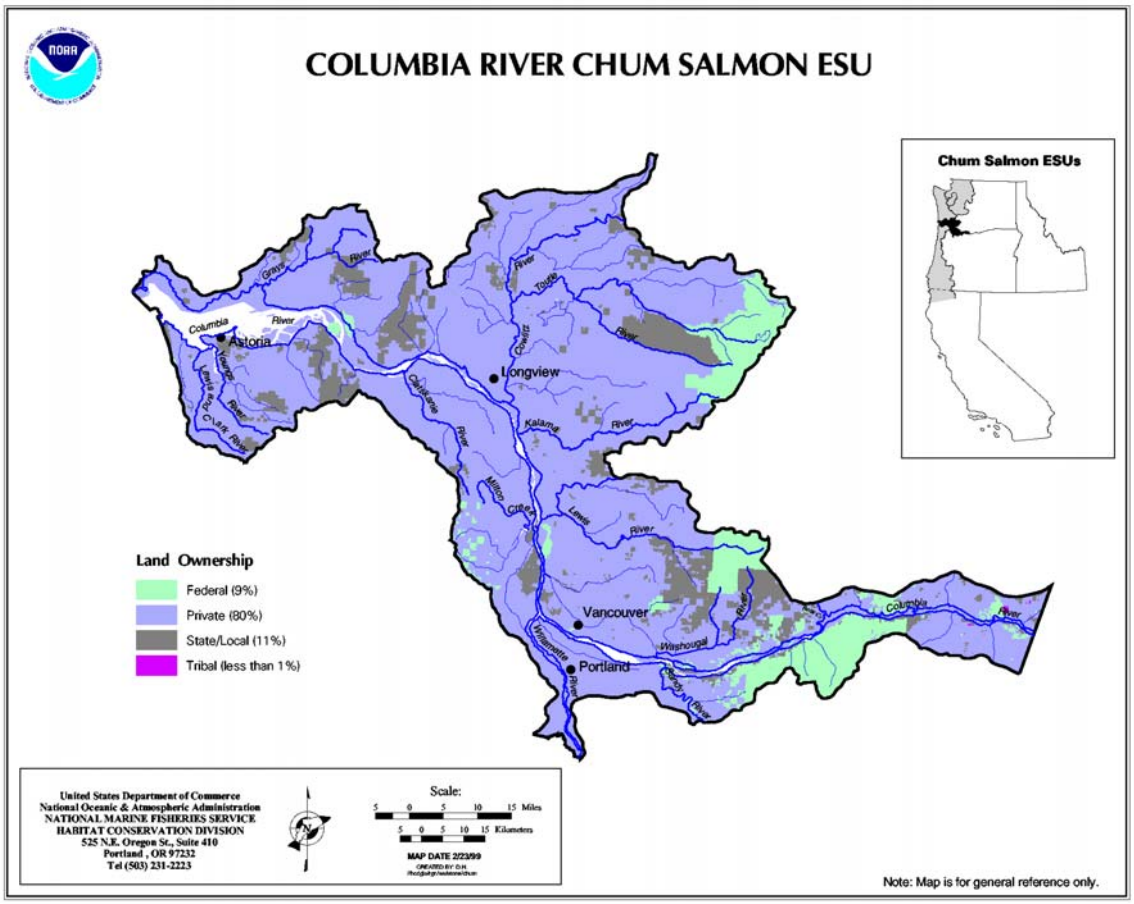
This FMEP includes all non-Indian recreational fisheries that affect or could potentially affect populations of chum salmon in Oregon tributaries of the Columbia River (Table 1). The fishery management area is described in section 1.2.1 of the FMEP (Figure 1).

There are no fisheries that target chum salmon in the Columbia River mainstem and tributaries. However, several fisheries may indirectly impact chum salmon (see Table 1 of the FMEP). Table 1 summarizes the fisheries typically conducted in the action area, and indicates the method of consideration under the ESA. The FMEP excludes those mainstem Columbia River fisheries managed under *U.S. v. Oregon* and ocean fisheries that may encounter this ESU. The mainstem Columbia River fisheries undergo section 7 consultation initiated by the parties to *U.S. v. Oregon*, and the ocean fisheries undergo section 7 consultation initiated by the Pacific Fisheries Management Council. Tributary fisheries on the Washington side of the Lower Columbia River ESU are managed under the sole authority of the state of Washington. Washington Department of Fish and Wildlife has also submitted an FMEP for approval by NOAA Fisheries (WDFW 2003).

Table 1. Fisheries in Oregon tributaries that may impact Columbia River chum salmon.

Fishery	Area	Harvest method	Typical dates open	Effect on Columbia River chum salmon
Spring chinook	Lower Sandy River	Angling only	Feb.1 - Oct. 31	C
Fall chinook	Clatskanie, Klaskanine, Lewis and Clark, and Young's Rivers	Angling only	Late May - Dec. 31	A
	Big, Bear, and Upper Gnat Creeks	Angling only	Late May - Aug. 31; Oct. 1 - Dec. 31	A
	Lower Sandy River	Angling only	Feb. 1 - Oct. 31	A
Coho	Klaskanine, Lewis and Clark, and Young's Rivers	Angling only	Aug. 1 - Oct. 31	A
	Big, Bear, and Upper Gnat Creeks	Angling only	Late May - Aug. 31; Oct. 1 - Oct. 31	A
	Lower Sandy River	Angling only	Sept. 1 - Oct. 31	A
Winter steelhead	Clatskanie, Klaskanine, Lewis and Clark, and Young's Rivers	Angling only	Late May - March 31	A
	Big and Gnat Creeks	Angling only	Oct. 1 - March 31	A
	Lower Sandy River	Angling only	Year round	A
Summer steelhead	Lower Sandy River	Angling only	Year round	C
Trout	Columbia River Tributaries	Angling only	Late May - Late Oct.	B
Warmwater species	Standing waters	Angling only	Year round	C

A = potential for incidental encounter of Columbia River chum salmon adults, B = limited potential for incidental encounter of Columbia River chum salmon juveniles, and C = Columbia River chum salmon are not encountered.



Sets forth the management objectives and the performance indicators for the plan.

The Columbia River chum salmon FMEP specifies that the overall management intent is to harvest hatchery-origin salmon and steelhead and other fish species in a manner that does not jeopardize the survival and recovery of the listed chum salmon ESU. All tributaries in the Columbia River ESU have been closed to the retention of chum salmon since 1992, and the retention prohibition will continue.

The performance indicators for the management objectives of the Columbia River chum salmon FMEP are fully described in sections 1.1.1 and 3.1 of the FMEP. Included are indicators addressing population parameters and measures of fishery performance. The primary fish population indicators for Oregon chum salmon are escapement indices based on spawning ground counts in Columbia River tributaries. ODFW began conducting extensive spawning ground surveys for Columbia River chum salmon in 2000.

Performance indicators also include fishery indicators for monitoring fishery performance and regulating impacts within prescribed limits. The primary indicators of fishery impacts in Oregon's tributaries are creel censuses. There are two main indicators for fishery impacts on chum salmon in the Columbia River mainstem: (1) landing information in commercial gillnet fisheries as reported on fish receiving tickets, and (2) information on the chum salmon encounter rate from a statistical recreational creel sampling program. Commercial fishery age composition and average weight information is also obtained by sampling the catch at commercial fish buying stations.

In addition, NOAA Fisheries evaluates whether the FMEP adequately addresses the following criteria:

4(i)(A) Defines populations within affected ESUs, taking into account: spatial and temporal distribution, genetic and phenotypic diversity, and other appropriate identifiably unique biological and life history traits.

The Columbia River chum salmon ESU historically contained large runs of chum salmon that supported a substantial commercial fishery in the first half of the century. These landings represent a harvest of more than 500,000 chum salmon in some years. Historically, chum salmon were abundant in the lower reaches of the Columbia River and may have spawned as far upstream as the Walla Walla River (over 500 km inland). Currently chum salmon are limited to tributaries below Bonneville Dam, with the majority of fish spawning on the Washington side of the Columbia River. Many lower Columbia tributaries once produced chum salmon, however, substantial chum salmon natural production is currently limited to just two areas in Washington: Grays River near the mouth of the Columbia River, and Hardy and Hamilton Creeks/Ives Island area, which is just downstream of Bonneville Dam. Small numbers of adult chum salmon have been observed in several other lower Columbia River tributaries.

ODFW has identified 23 spawning populations on the Oregon side of the Columbia River, but they do not have estimates of abundance and consider Oregon chum salmon populations to be very depressed or extinct (Kostow 1995). A few chum salmon cross Bonneville Dam in some years, but these are likely lost to the system as there are no known spawning areas above Bonneville Dam. Although current abundance is only a small fraction of historical levels, and much of the inter-population diversity has presumably been lost, the total spawning run to the Columbia River has been relatively stable since the mid 1950's, and total natural escapement for the ESU is probably at least several thousand fish per year. In 2001, the Washington Department of Fish and Wildlife estimated that 10,000 chum salmon returned to the Columbia River. In 2002, an estimated 10,000 returned to Grays River and an additional 10,000 returned to the spawning areas below Bonneville Dam.

Grays River chum salmon enter the Columbia River from mid-October to mid-November, but apparently do not reach the Grays River until late October to early December. These fish spawn

from early November to late December. Fish returning to Hamilton and Hardy Creeks begin to appear in the Columbia River earlier than Grays River fish (late September to late October) and have a more protracted spawn timing (mid-November to mid-January).

This FMEP includes Columbia River chum salmon residing below impassable natural barriers in the Columbia River and Oregon tributaries downstream from Bonneville Dam (Figure 1). All other listed ESUs in the Columbia basin are either not affected by the fisheries included in this FMEP or impacts from the fisheries will be addressed in other FMEPs or section 7 consultations. These ESUs include Upper Willamette River spring chinook salmon; Lower Columbia River steelhead and chinook salmon; Snake River spring/summer chinook salmon, fall chinook salmon, sockeye salmon, and steelhead; Upper Columbia River steelhead and spring chinook salmon; and Middle Columbia River steelhead.

4(i)(B) Uses the concepts of ''viable'' and ''critical'' salmonid population thresholds, consistent with Viable Salmonid Populations (VSP) concepts in "Viable Salmonid Populations."

The regulations in the 4(d) Rule state that an FMEP must use the concepts of "viable" and "critical" thresholds (McElhany *et al.* 2000) in a manner so that fishery management actions: (a) recognize significant differences in risk associated with viable and critical population threshold states; and (b) respond accordingly to minimize long-term risks to population persistence. Harvest actions that affect populations at or above viable threshold must maintain the population or management unit at or above the viable level. Impacts on populations above critical levels but not at viable levels (demonstrated with high degree of confidence) must not appreciably slow achievement of viable function. Impacts on populations functioning at or below critical threshold must not appreciably increase genetic and demographic risks facing the population and must be designed to permit achievement of viable functions, unless the FMEP demonstrates the likelihood of survival and recovery of the entire ESU in the wild would not be appreciably reduced by greater risks to an individual population.

NOAA Fisheries' "Viable Salmon Population and Recovery of ESUs" document (McElhany *et al.* 2000) describes four key parameters for evaluating the status of salmonid populations. These parameters are population size (abundance), population growth rate (productivity), spatial structure, and diversity. The CR chum salmon FMEP establish interim critical thresholds for chum salmon populations in the Oregon tributaries. Thresholds are being reviewed and modified through the recovery planning efforts by the Technical Recovery Team. The information produced by the TRT will be incorporated into the into the comprehensive review process for this FMEP. Below is an evaluation of whether the FMEP adequately addresses the VSP parameters for Columbia River chum salmon.

Population Size

Due to the severely depressed status of Oregon Columbia River chum salmon and little or no historic data for this portion of the ESU, a specific critical threshold has not been defined for this population. However, the ODFW uses an interim critical abundance threshold of 300 spawners per year as defined by Oregon State Wild Fish Management and Wild Fish Gene Resource Conservation Policies (OAR 635-07052 and OAR 635-07-538). Spawner numbers of 300 or greater appear sufficient to avoid detrimental short-term genetic effects. This interim approach is consistent with VSP guidance. Technical Recovery Teams will be establishing specific criteria for listed ESUs. However, management actions still need to be taken while recovery goals are being established. Therefore, according to VSP guidance, interim criteria should be based on the population definitions already established in state wild fish conservation reports or similar stock-based management plans (McElhany *et al.* 2000). These criteria will be improved as more information becomes available.

A "viable threshold" depends on the capacity and productivity of the available habitat and the corresponding population size where compensatory population processes begin to provide resilience. Population size, habitat capacity, and productivity are unavailable for Oregon Columbia River chum salmon populations, thus viable population sizes have not been defined. The Technical Recovery Teams will be developing viable thresholds for Columbia River chum salmon populations.

Population Growth Rate

Assessing Oregon's Columbia River chum salmon productivity is not feasible due to extremely limited spawning ground survey data with almost no observed spawners. However, NOAA Fisheries estimates a median population growth rate (lambda) for the entire ESU from 1980 through 1998 as 1.04 (McClure *et al.* 2000). In addition, as previously discussed, there has been a recent increase in the run size of chum salmon to Washington tributaries of the Columbia River.

Spatial Structure

It is possible for fisheries to affect the spatial structure of a population and/or ESU. For example, a fishery could target a certain portion of the run, which may result in a substantial decrease in the number of spawners destined for a particular spawning location or population through time. The early portion of a run of salmon may be made up of fish that migrate furthest upstream. If the fishery harvests the early returns, the spawning distribution of a population may change. Fishery impacts on Columbia River chum salmon are only incidental and occur during the entire adult chum salmon migration. As a result, fisheries are not expected to affect the spatial structure of the Columbia River chum salmon ESU.

Chum salmon usually spawn in the lower reaches of rivers, and redds are usually dug in the mainstem or side channels of rivers. As a result, the loss of historic habitat from the construction of dams and habitat degradation has contributed to the loss of the spatial integrity of chum salmon

populations more than any other factor. In addition, most of the available spawning and rearing areas are degraded with altered flows and water quality. Habitat restoration will be necessary to address current spatial structure deficiencies within the ESU.

Diversity

High fishing rates can affect the diversity of a population by leading to inbreeding depression. According to ODFW, Oregon populations of chum salmon are depressed or extinct and have already suffered loss of genetic integrity due to inbreeding depression. However, because the populations are so small, any harvest could potentially affect the diversity of a single Oregon chum salmon population. Currently, there are no fisheries directed at chum salmon in the ESU, and incidental impacts are expected to impact 0.5% of Oregon chum salmon. Impacts could be further reduced by closing all fisheries that could potentially impact Columbia River salmon. However, NOAA Fisheries believes that the loss of diversity in Oregon chum salmon populations will not affect the likelihood of survival and recovery of the Columbia River chum salmon ESU. For Oregon populations of chum salmon to recover, habitat will have to be improved, and chum salmon from larger populations within the ESU will have to reseed areas where only remnant chum salmon populations exist now. In addition, there is no evidence that any one of Oregon's 23 depressed populations is an indispensable component of the ESU.

4(i)©) Sets escapement objectives or maximum exploitation rates for each management unit or population based on its status, and assures that those rates or objectives are not exceeded.

Until VSP thresholds are established for the Columbia River chum salmon ESU, ODFW has proposed an interim maximum exploitation rate of 2% for chum salmon in the tributary fisheries. The retention of chum salmon is prohibited in all Columbia River tributaries. As a result, impacts on listed chum salmon will depend on their encounter rate, the associated catch and release mortality, and illegal harvest. ODFW estimates the encounter rate of chum salmon in Columbia River tributaries is less than 5%. Assuming a catch and release mortality of 10%, the tributary recreational fishing mortality rate has been less than 1% from 1992 to the present and is expected to continue at this very low level. In addition, ODFW, in conjunction with WDFW through the Columbia River Compact, has used time and area closures to establish sanctuaries, which are closed to commercial fishing to protect chum salmon. Illegal harvest is negligible.

There are no commercial fisheries directed at Columbia River chum salmon, but there is incidental impact associated with the commercial coho salmon gillnet fishery. Historically, the vast majority of chum salmon impacts occurred in the mainstem commercial gillnet fishery during November and December. However, since 1990 commercial gillnet fisheries have been closed during these months to protect late returning Lower Columbia River coho and chum salmon. Expected impacts in mainstem Columbia fisheries are less than 2% and will not exceed 5%, which is consistent with the NOAA Fisheries biological opinion and incidental take statement (NMFS 2000a). These impacts are in addition to the impacts expected in the tributaries and will

be addressed in section 7 consultations. They are discussed here in order to consider cumulative impacts on the Columbia River chum salmon ESU. There is very little specific information on the ocean distribution of Columbia River chum salmon, but given the timing and distant location of fisheries directed at chum salmon, it is unlikely that Columbia River chum salmon are markedly affected by ocean fisheries (NMFS 2000b).

To ensure that chum salmon population and fishery management are meeting the goals described in this plan, annual monitoring will occur, and additional restrictions in mainstem Columbia River fisheries may be implemented. Fishery restrictions may involve a combination of time and area closures as necessary.

4(i)(D) Displays a biologically based rationale demonstrating that the harvest management strategy will not appreciably reduce the likelihood of survival and recovery of the ESU in the wild, over the entire period of time the proposed harvest management strategy affects the population, including effects reasonably certain to occur after the proposed actions cease.

Section 2 "Effects on ESA-listed Salmonids" of the FMEP includes the complete analysis of the biological impacts associated with ODFW's proposed fisheries. To briefly summarize, there are no data available to determine appropriate harvest rates for chum salmon in the Columbia River. However, the incidental catch of chum salmon in the Columbia River basin is limited to a few tens of fish per year (NMFS 2002d). The harvest rate in the proposed mainstem fisheries is expected to be 1.6% and is almost certainly less than 5%. The harvest rate in the proposed tributaries fisheries is expected to be 0.5% and is almost certainly less than 2%.

NOAA Fisheries' Northwest Fisheries Science Center (NWFSC) calculated the population growth rate (lambda) for Columbia River chum salmon ESU (McClure *et al.* 2000). Lambda values were based on population trends observed in the period from 1980 through 1998 in the Grays River mainstem and west fork, Crazy Johnson Creek (Grays River tributary), and Hamilton Creek. The NWFSC estimated that the lambda value for Columbia River chum salmon populations over this base period was 1.04 indicating that the population levels are increasing and that there is little short or long-term risk of extinction or substantial decline. Columbia River mainstem harvest rates during the 1980's and early 1990's were greater than current harvest rates (ODFW and WDFW 2000). Based on these considerations, NOAA Fisheries concludes that the impacts associated with this FMEP are not likely to appreciably reduce the likelihood of survival and recovery of Columbia River chum salmon.

4(i)(E) Includes effective (a) monitoring and (b) evaluation programs to assess compliance, effectiveness, and parameter validation.

Section 3 (Monitoring and Evaluation) of the FMEP provides a detailed explanation of the monitoring programs throughout the basin. A spawning ground survey program for the Columbia

River chum salmon was initiated by ODFW in 2000 with the goal of providing an index of population size. Recreational fisheries in the mainstem Columbia and Select Areas are monitored by a formal creel census program. Recreational catch estimates in areas not monitored by creel surveys are unknown. Compliance is estimated as the percentage of angler contacts where no violations are noted and is very high.

In addition to the monitoring programs discussed in the FMEP, there are numerous other ongoing projects which provide additional information useful for fisheries management. Chum salmon are documented while ODFW conducts routine spawning ground surveys at numerous index sites for lower Columbia River coho and chinook salmon. Extensive habitat monitoring and evaluation is conducted in association with the Oregon Plan for Salmon and Watersheds, Oregon Forest Practices Act, and routine environmental protective activities related to United States Army Corp of Engineers (USACE) fill and removal permitting.

4(i)(F) Provides for (a) evaluating monitoring data; and (b) making any revisions of assumptions, management strategies, or objectives that data show are needed.

As fully explained in sections 3.5.1 and 3.5.2 of the FMEP, ODFW will evaluate the monitoring data on an annual basis. These reports will include biological and fishery information from the previous year and an assessment of how the fisheries performed with respect to the objectives and guidelines established in the FMEP. In addition, a comprehensive review of the FMEP is scheduled to occur in 2004 to evaluate whether the fisheries and natural populations are performing as expected. Comprehensive reviews will be repeated at 5 year intervals thereafter until such time as the natural stocks are recovered and delisted. The comprehensive reviews will allow management assumptions to be further verified and allow new information or findings to be incorporated into the FMEP. This includes the determinations from formal recovery planning efforts by the Technical Recovery Teams.

4(i)(G) Provides for (a) effective enforcement, (b) education, ©) coordination among involved jurisdictions.

The enforcement program is described in section 3.4 of the FMEP. The Fish and Wildlife Division of the Oregon State Police works in close partnership with ODFW to develop enforceable regulations to achieve fish and wildlife resource goals. Enforcement activities in the Columbia River chum salmon ESU are conducted from offices in Astoria, Scappoose, and Portland.

ODFW and OSP work together to facilitate enforcement of resource management goals through an annual cooperative enforcement planning process. Troopers meet annually with local biologists to set enforcement priorities by species, developing tactical plans addressing priority issues related to compliance levels sufficient to protect resources and meet management goals. The results of each tactical plan are quantified and compared to the compliance level considered

necessary to meet management goals. Compliance goals are typically estimated based on the percentage of angler contacts with no noted violations and the tactical plans are adjusted as needed to meet management goals.

The FMEP describes measures that will be taken to inform and educate the public about the fisheries (section 3.3 of the FMEP). ODFW has an extensive public involvement process to inform anglers of fishing regulations and the proper techniques for catching and releasing fish. The management area specified in the FMEP is under the sole regulatory jurisdiction of ODFW.

4(i)(H) Includes restrictions on resident and anadromous species fisheries that minimize any take of listed species, including time, size, gear, and area restrictions.

The fisheries within the Management Area specified in the FMEP (section 1.2.1) include many fishing restrictions specifically designed to control impacts on juvenile and adult chum salmon. The discussion of criterion Table 1, above, provides a description of the proposed tributary fisheries. These regulations are currently in effect as Oregon state law and will remain in effect in the foreseeable future. In the future, if there are proposals to change existing angling regulations, ODFW, will first confer with NOAA Fisheries before adoption, as stated in the FMEP, and in section 223.203 (4)(iii) of the 4(d) Rule for CR chum salmon.

4(i)(I) Is consistent with other plans and conditions established within any Federal court proceeding with continuing jurisdiction over tribal harvest allocations.

There are no Federal court proceedings with continuing jurisdiction over tribal harvest allocations that are relevant to the implementation of the FMEP with respect to Columbia River chum salmon.

(4)(ii) The state monitors the amount of take and provides to NOAA Fisheries a report on a regular basis.

As described in section 3.5.1 of the FMEP, ODFW will assess compliance with the provisions of the FMEP annually. The chum salmon run will be monitored every year through spawning ground surveys and run estimates will be used to derive population thresholds. An annual report summarizing their findings will be provided to NOAA Fisheries by March 31st of each year.

A comprehensive review of the FMEP will occur every five years. These reviews will evaluate whether the FMEP is accomplishing the stated objectives and revise management strategies if necessary. This review will be in cooperation with NOAA Fisheries.

(4)(iii) The state confers with NOAA Fisheries on its fishing regulation changes.

As stated in section 3.5.1 of the FMEP, ODFW will confer with NOAA Fisheries on any fishing regulation changes that may affect listed chum salmon in the Lower Columbia River Basin.

Information on the proposed regulation change will be provided at least 2 weeks in advance of the decision being made.

(4)(iv) Written concurrence with the FMEP.

If the concurrence is made that the FMEP adequately addresses all of the criteria specified in limit #4 of the 4(d) Rule, NOAA Fisheries will issue a letter of concurrence to ODFW, which will specify the necessary implementation and reporting requirements.

Processing of the Public Comments Received.

As required in (4)(iii) of section 223.203 of the 4(d) Rule, before a FMEP can be approved or amended, the public must have had an opportunity to review and comment on the FMEP. A Notice of Availability and Request for Comment on the Columbia River chum salmon FMEP was published on September 12, 2001 (65 FR 47452). NOAA Fisheries received no public comments.

RECOMMENDED DETERMINATION

As evaluated above, the Salmon Recovery Division recommends that the Regional Administrator determine that the FMEP for fisheries potentially affecting ESA-listed Columbia River chum salmon submitted by ODFW adequately addresses all of the criteria established for limit #4 of the 4(d) Rule. If the RA so finds and approves the FMEP, the take prohibitions would not apply to fisheries implemented in accordance with the approved FMEP and NOAA Fisheries' letter of concurrence.

Literature Cited

Kostow, K. (editor). 1995. Biennial report on the status of wild fish in Oregon. Internal Report, Oregon Department of Fish and Wildlife. Portland, Oregon.

McClure, M., B. Sanderson, E. Holmes, C. Jordan, P. Kareiva, and P. Levin. 2000. Revised Appendix B of standardized quantitative analysis of the risks faced by salmonids in the Columbia River basin. National Marine Fisheries Service, Northwest Fisheries Science Center. Seattle, Washington.

McElhany, P., M. H. Rucklelshaus, M. J. Ford, T. C. Wainwright, and E. P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. NOAA Technical Memorandum NMFS-NWFSC-42. Seattle, Washington.

NMFS (National Marine Fisheries Service). 2000a. Endangered Species Act section 7 consultation. Biological opinion on impacts of Treaty Indian and non-Indian year 2000 winter, spring, and summer fisheries in the Columbia River basin, on salmon and steelhead listed under the Endangered Species Act. February 29, 2000. National Marine Fisheries Service. Seattle, Washington.

NMFS. 2000b. Endangered Species Act section 7 consultation. Biological opinion on effects of Pacific Coast ocean and Puget Sound fisheries during the 2000-2001 annual regulatory cycle. April 28, 2000. National Marine Fisheries Service. Seattle, Washington.

ODFW (Oregon Department of Fish and Wildlife) and Washington Department of Fish and Wildlife (WDFW). 2000. Status Report. Columbia River fish runs and fisheries, 1938 - 1999.

ODFW. 2001. Fisheries Management and Evaluation Plan. Lower Columbia River Chum Salmon in Oregon Freshwater Fisheries of the Lower Columbia River Mainstem and Tributaries Between the Pacific Ocean and Bonneville Dam. August 13, 2001. Submitted to NMFS. Portland, Oregon.

WDFW (Washington Department of Fish and Wildlife). 2003. Fisheries management and Evaluation Plan. Lower Columbia River. March 31, 2003. Submitted to NMFS. Portland, Oregon.